CS 280
Programming Language Concepts

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Ethical Conduct

•Cheating during in-class tests or take-home examinations or homework is illegal and immoral.

•Copying code from another person is cheating.

•Giving someone else your work to copy is cheating.

•The essential quality of the NJIT **University Code on Academic Integrity** is that each student shall demonstrate honesty and integrity in the completion of all assignments and in the participation of the learning process. Adherence to the University Code on Academic Integrity promotes the level of integrity required within the university and professional communities and assures students that their work is being judged fairly with the work of others.
See http://www.njit.edu/academics/pdf/academic-integrity-code.pdf

CS 280 - Programming Language Concepts

Conceptual study of programming language syntax, semantics and implementation. Course covers language definition structure, data types and structures, control structures and data flow, run-time consideration, and interpretative languages.

- Programming languages have common concepts that are seen across all languages
- This course will discuss and illustrate these common concepts:
  - Syntax
  - Names
  - Types
  - Semantics
- With some discussion of:
  - Memory Management
  - Event Driven Programming
  - Concurrency and Parallelism
- We will show them in the context of:
  - Imperative Programming
  - Object-Oriented Programming
  - Functional Programming (maybe)
  - Logic Programming (maybe)

Course Goals

- Understand the building blocks of programming languages.
- Learn about common features in programming languages and how different languages implement those features.
- See how you can learn one language easily given that you know another.

- **This should not be your first programming class**
- **You will spend a lot of time writing C++ programs**

Things I Expect You To Know

- Because of the prerequisites for this class, I expect that:
  - You have written programs before
  - You know what a variable is
  - You know how to use if/else statements, for/while loops, and functions
  - You know data structures such as stacks, lists, queues and trees
  - You know what I mean when I talk about complexity and say things like “Constant time” or “order N”

Class rules

- Turn off your cell phones.
- Don’t connect to me on any social media
- Assignments
  - Due at midnight on Wednesday
  - Late work is penalized by 30%
  - After midday Sunday, you will receive a 0 for the submission
  - Failing to submit 2 of programs 1-4 results in an F for the class.
  - Failing to submit 1 program makes it impossible to receive an A for the class
- I don’t give extra credit.
- Be professional
- Be adult

Coursework and Grades

Programs	45%
Midterm	22%
Final	33%

- There will be 1 small (5 point) program to start, and 4 large (10 points each) programming projects. The large projects will have weekly submissions due

- There will be one common midterm exam
- There will be one comprehensive final exam
- Exams are closed book and notes
- I will give you a reference sheets for exams

- In my experience, performance is distributed along a bell curve. Grades will be as well.

Programming Projects

- All programming projects will use C++ 11
- All assignments will be run and tested on the Vocareum system. This is a cloud based system that you can reach via Moodle
- Vocareum has features to automate the building, running, submitting and grading of your assignments
- Vocareum has a Linux terminal window in addition to windows to edit your code
- Vocareum also comes with cheat detection software. Be warned

Programming Projects

- Each assignment in Vocareum has a “work” folder. When you “Submit” your assignment, you are submitting your entire work folder.
- The system will assume every C++ source file in the work folder is part of your assignment, and will compile everything and link everything together

Programming Projects

- The programming projects are such that you will have to write and submit some code every week.
- NOTE: You do not have to do your work on Vocareum. You may work on any system that you like and use any tools that you like.
- HOWEVER when you are done you must upload your code to Vocareum in order to submit your assignment.
- In other words, don’t use the phrase “but… but… it works on my machine!!” when complaining about your grades.

Integrated Development Environments

- There are many IDEs available
  - Xcode comes with Macs
  - Microsoft Visual Studio is available on Windows
  - Eclipse is a free download
  - Other possibilities: codeblox, qt, jEdit
- If you are comfortable with one of these, pick it and use it; just make sure that you upload your code to Vocareum to submit
- Make sure you have a C++ compiler that supports C++11

Using NJIT Linux

- NJIT has Linux systems available for everyone; everyone can log in using their UCID
- Run this command to make sure you have the proper version of the compiler:
  - module load gcc/4.9.2
- The compiler is called g++
- Make sure you compile using the command line option - -std=c++0x to activate C++11 features
- You can use eclipse from the NJIT Linux systems but you may find it terribly slow if you are dialing in remotely

Using Your own Linux

- Download the latest gnu c++ compiler, or install it using whatever package management system you have on your machine
- Use the most recent version available
- The compiler is called g++
- Make sure you compile using the command line option –std=c++0x to activate C++11 features

Using a Macintosh

- The clang compiler and Xcode are excellent tools
- There may be a checkbox in preferences somewhere to activate C++ 11 features; make sure that you check it

Using Windows - VS

- Visual Studio is available for free download for students
- Be aware that there are several non-portable windows-only things that will prevent your code from working on Linux
- If your code works on VS but does not work on Vocareum's, then it is "not portable" and from the perspective of the course, it does not work

Using Windows – Not VS

- Windows users can get the GNU C++ compiler for free from cygwin or mingw or msys2
- MSYS2 steps:
  - Download and install MSYS2 from www.msys2.org
  - Start the msys2 mingw 64-bit shell
  - Run "pacman –Syu" twice to update all packages
  - Run "pacman -S mingw-w64-x86_64-gcc" to get the compiler
- You can use the command line or you can use it with an IDE

Testing, Submitting, Grading

- Vocareum will have buttons for each assignment to BUILD (make sure the code compiles), RUN (compile the program and run the test cases), and SUBMIT (hand in your work).
- You can run your program from the Linux command line interface on Vocareum if you like
- A program that does not compile will be treated as though you did not do the assignment
- Remember, a student failing to do two programming assignments will get an F for the course
- A student failing to do one programming assignment will not be able to get an A for the course
- Each assignment will come with intermediate deliverables; there will be penalties assessed for not doing these intermediate steps

More Notes on Programming for CS280

- If you are doing work on a different machine before submitting it through Vocareum, you should **avoid** unique things from your platform that might make your program fail on a standard linux system:
  - Conio.h
  - Stdafx things (if you are using Visual Studio)
  - QT classes (if you are using Qt Creator)
  - Experimental language features

Linux Notes

- Vocareum is a cloud-based linux system
- UCS is also running linux
- It is generally a good idea for a CS person to have some familiarity with linux and Unix
- A good tutorial: http://www.ee.surrey.ac.uk/Teaching/Unix

There's A Lot Of Programming In This Class

- Yes, there is.
- It's 45% of your grade.
- That's why "Programming" is in the title of the course.
- Because the only way to learn about programming languages is to write programs.

Advice From an Old Programmer

- The only way to learn to program is to program
- Get started as soon as you can and DO NOT PUT OFF THE WORK
- The answer to the question “what will it do if I try this?” is probably “Try it out, then tell me”
- Think first, then code
- Code a little. Test a little.
- Everything Is Everything Else